

# Visual Scanning as an Index of Pilot Skill Development

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The objective of this project is to provide helicopter instructor pilots with an integrated set of teaching aids to facilitate the acquisition of instrument scan patterns by students in motion-based, instrument flight simulators.

The instrument scan patterns of student naval aviators are noninvasively recorded with an eye tracker as they fly the sequences of simulator hops that comprise the training syllabus. The scan patterns and flight simulator data are time-stamped so that simulator performance can be analyzed as a function of scan pattern. A database comprising 15 flights from each of 100 student pilots is being assembled.

Data collection has been completed on 99 volunteer student pilots. A photo-realistic instrument-panel demonstration device that we developed to permit students to preview instrument flight has been evaluated by fleet users. Two Navy helicopter pilots have composed a didactic text for use with the demonstration device. An algorithm has been implemented to compute fixations based on the

eye-pointing data. The algorithm identifies the instrument the student is looking at at each point in time and the duration of each eye fixation. A procedure to measure differences between sequences of fixations has also been developed. A collaboration has been initiated with a former Navy instructor pilot, currently on the faculty of Ohio University, and a workplan has been created for developing objective scoring criteria for the recorded flight performance.

Observations of scan patterns during the course of our work have led us to develop a novel primary flight instrument display, the Oz Display. This display presents all primary instrument information required for flight in a way that is compatible with the evolved characteristics of the visual system. Consequently, navigational information presented with the Oz display is particularly easy to process. Pilot studies indicate that the new system yields demonstrable, practical improvements in flight performance over that attainable with traditional displays, particularly in visual multitasking conditions. Patenting is under way.

